

# **FY04, 05 Priorities and Plans**

## **BNL Dipole R&D**

Michael Anerella  
Superconducting Magnet Division  
Brookhaven National Laboratory  
Upton, NY 11973 USA

# Contents

## LARP Dipole R&D Priorities:

- Development and optimization of two different support structures (for the same magnetic design)
  - 3 part laminated collar support,
  - Stainless steel weldment
- Coil development as part of Base Program
  - 10 turn coils
  - 12T R&D magnet

# LARP Dipole Support Concept Review

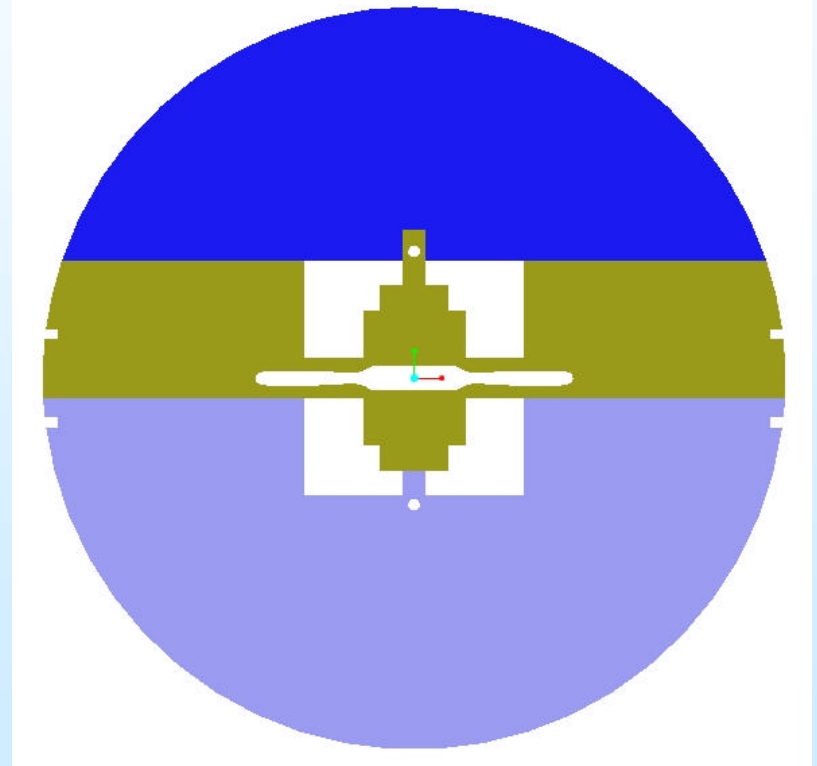
## Laminated Collar support

### Pros:

- Open midplane
- Easy (inexpensive) to build
- Accurate geometry

### But:

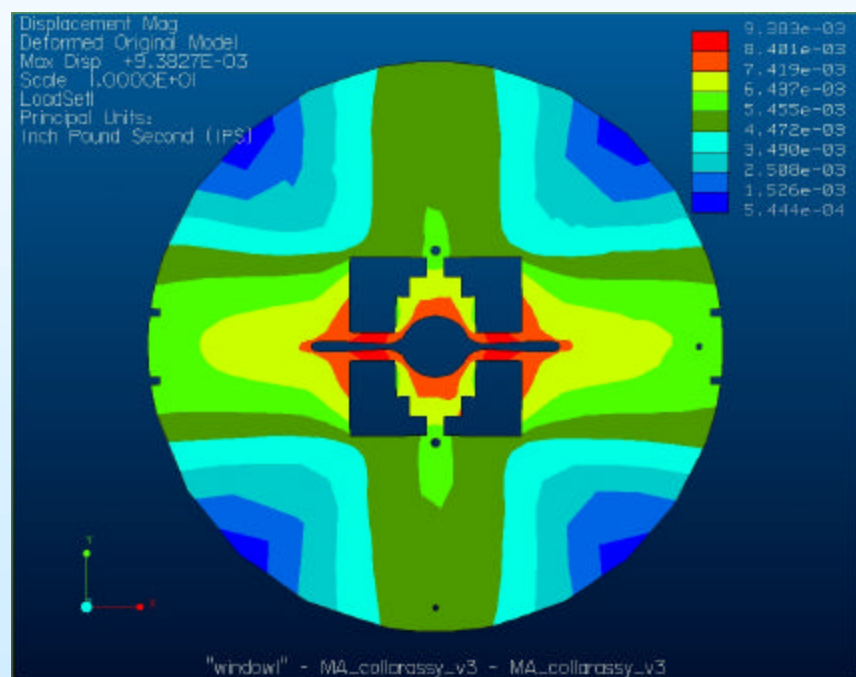
- Heat absorbed  
at 4K (old), 80K (new)



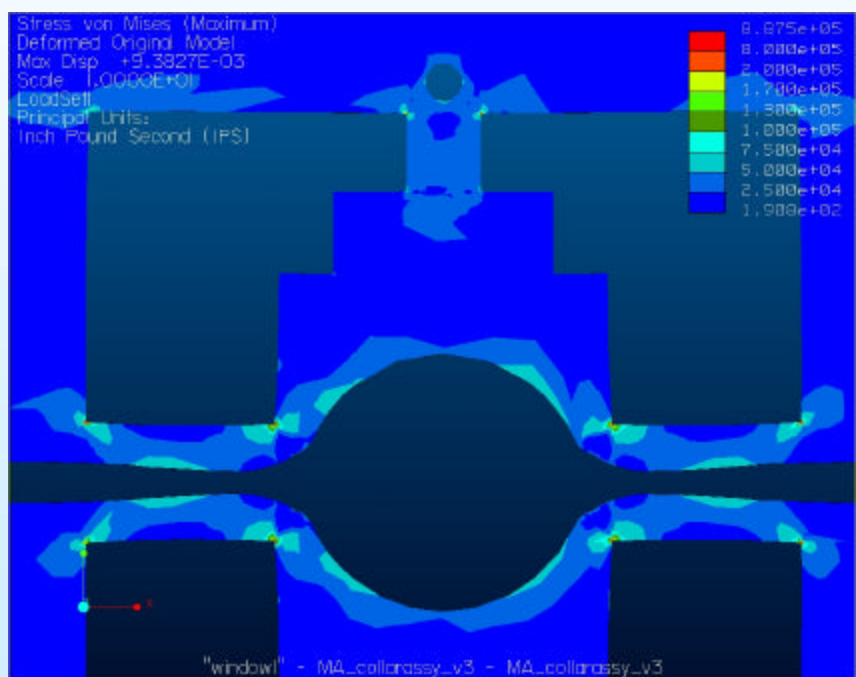
# LARP Dipole Support Concept Review

## Laminated Collar support (cont'd)

**Deflections**



**Stresses**



# LARP Dipole Support Concept Review

## Stainless steel weldment support

### Pros:

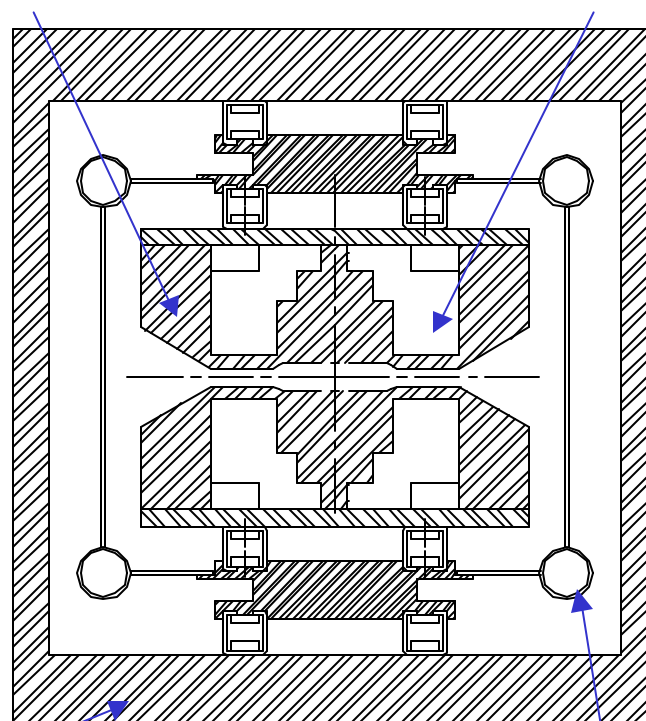
- Open midplane
- Heat absorbed ~300K

### Cons:

- More expensive
- Deflections vs. conductive heat load

4K support structure

SC coils



300K cryostat

80K heat shield

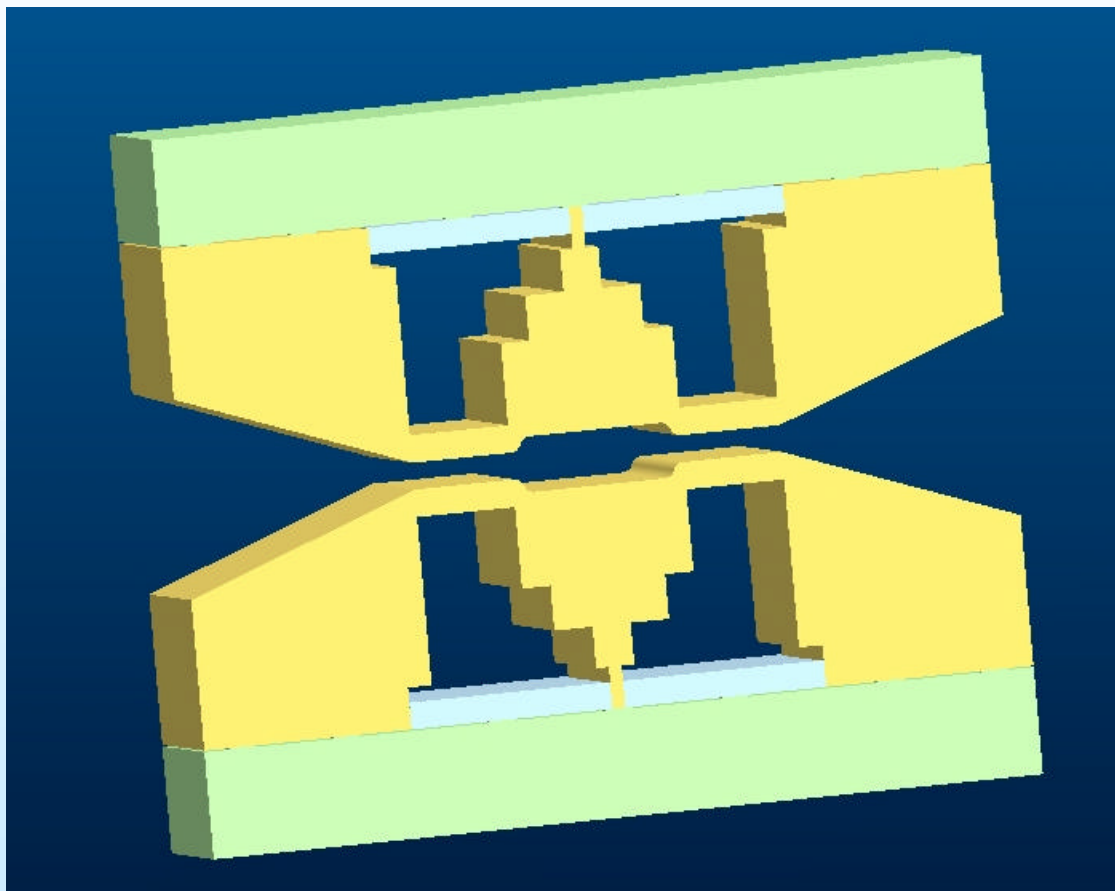
300K iron (not shown)

# LARP Dipole Support Concept Review

## Stainless steel weldment support (cont'd)

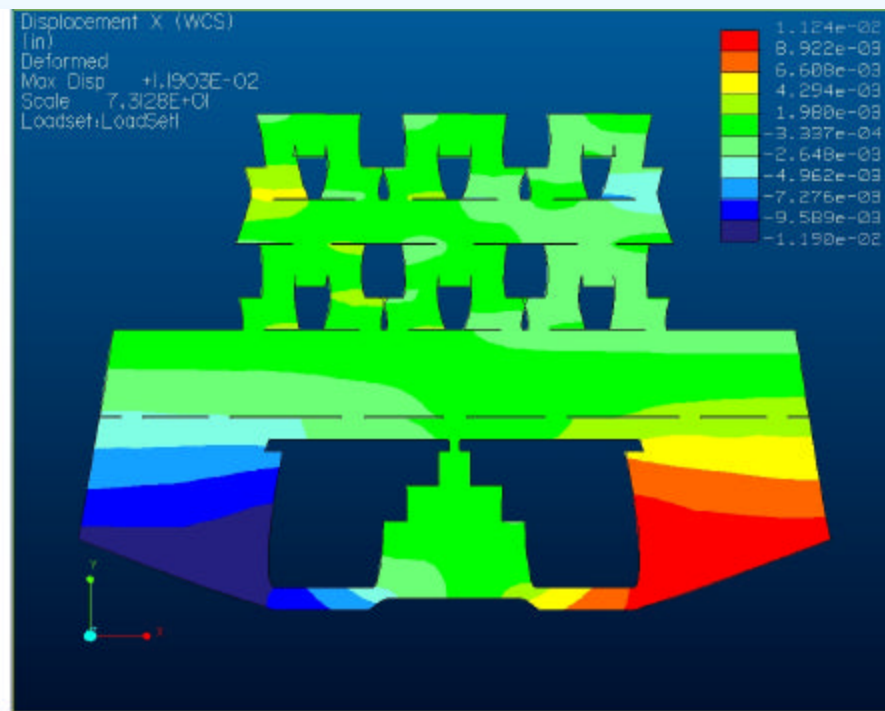
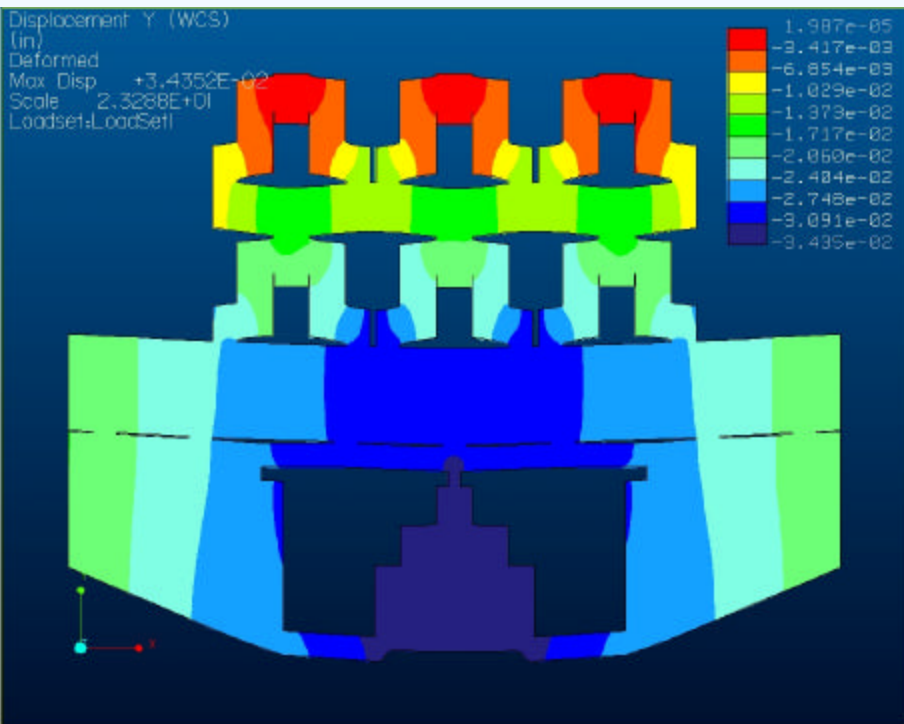
### Working model so far:

- Stresses ok
- 3/4 mm deflection
- 40w/m at 4K



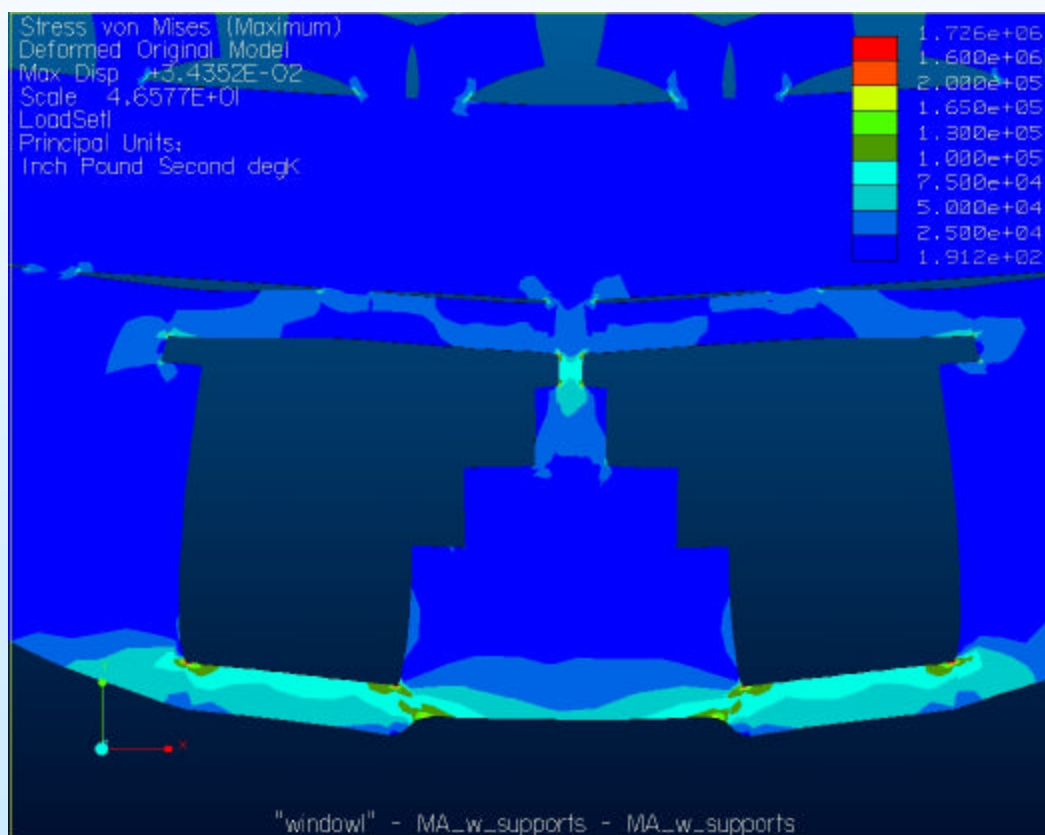
# LARP Dipole Support Concept Review

Stainless steel weldment support (cont'd)  
deflections



# LARP Dipole Support Concept Review

## Stainless steel weldment support (cont'd) peak stresses





## LARP Dipole Support Concept Review

### FY04, 05 Plans:

- Revise mechanical models to reflect most recent magnetic design
- Continue development of both configurations (i.e., work on weaknesses)
- Develop greater understanding of requirements
- Select and optimize final design

# Base Program Support

## Coil Development Plans

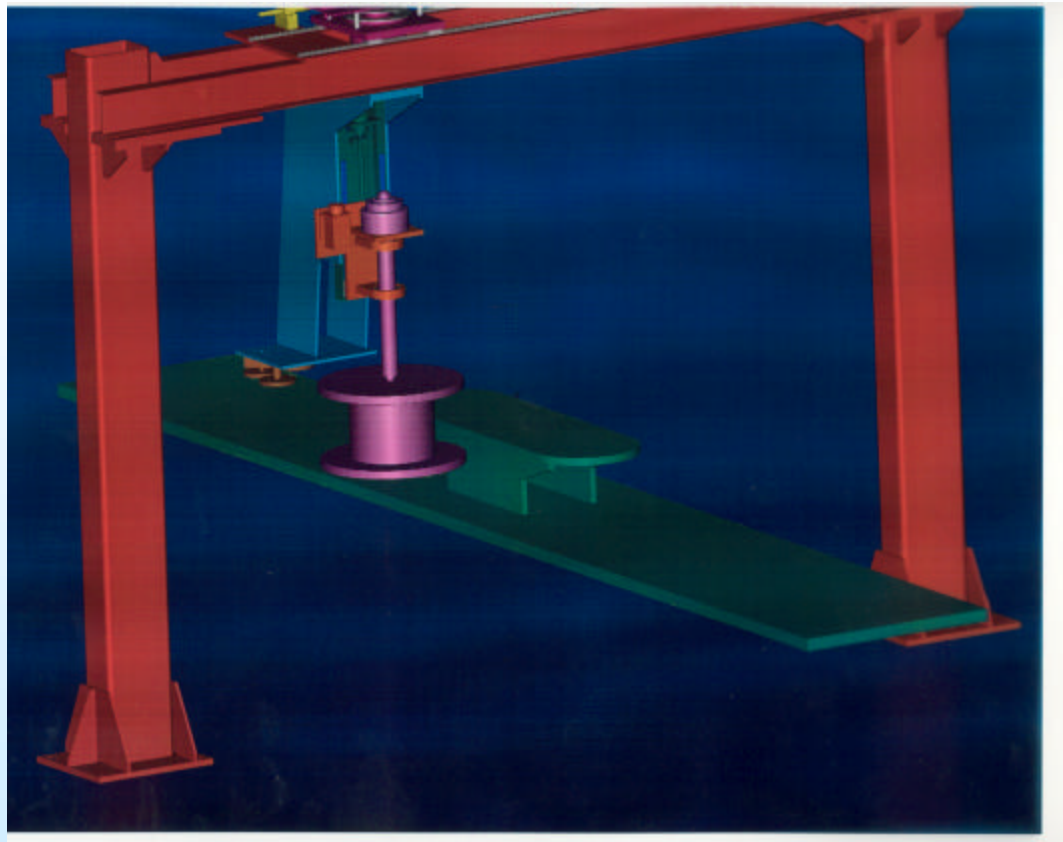
### Develop Infrastructure:

- new improved coil winder being brought on line
- utilize integrated approach to cable handling;  
react>wind on common spool, minimize risk

### Coil R&D:

- Initiate parametric studies in single coil tests;  
requires significant length of established sc cable

## New Versatile Coil Winder



The new winder will be used in winding future HTS and  $\text{Nb}_3\text{Sn}$  coils. This versatile winder will handle brittle materials better and will wind coils having different number of turns in various geometries.

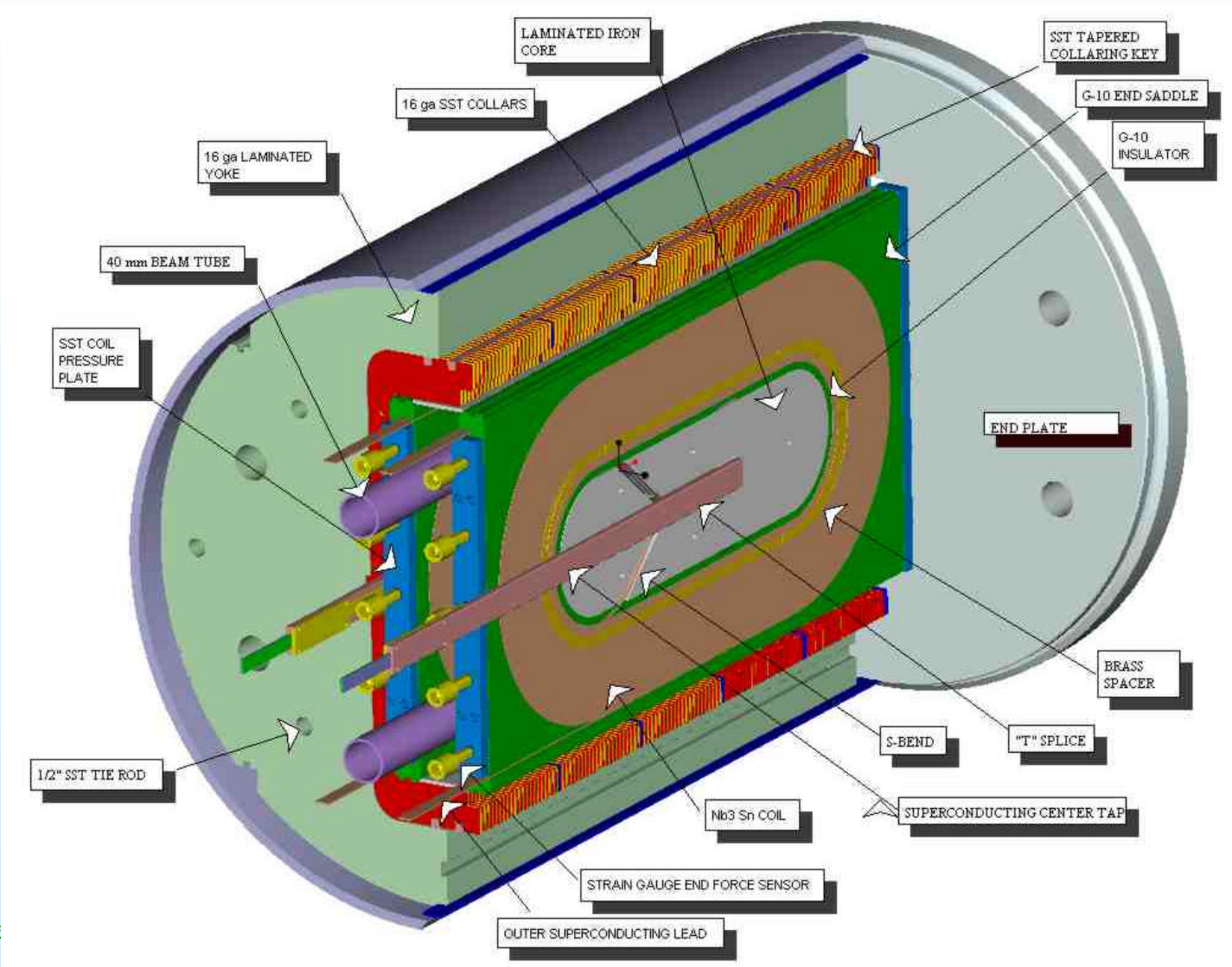
# Base Program Support

## 12T Magnet Program Plans

**Build and test the 12T R&D magnet  
(assumes successful coil development)**

- **many parts are available now (collars, yoke, etc.)**
- **Final test of qualified coils in full field**
- **Future test vehicle for high field cable testing**

**BNL 12 T Nb<sub>3</sub>Sn Common Coil Background  
Field Dipole**



M. Anc

# Summary

- **Two good candidates are being examined for an open midplane dipole.**
- **Continued interaction should lead to a successful final design.**
- **Continued effort in the Base Program for coil development is essential.**
- **Funding is also helpful.**